

Yashraj Chavhan

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Current position

Postdoctoral Fellow, Department of Molecular Biology, Umeå University, Umeå (Sweden)

Peer reviewed publications:

5. Chavhan, Y., Malusare, S. and Dey, S. (2021). Interplay of population size and environmental fluctuations: A new explanation for fitness cost rarity in asexuals. *Ecology Letters* 24, 1943–1954.
4. Chavhan, Y., Malusare, S., and Dey, S. (2020). Larger bacterial populations evolve heavier fitness trade-offs and undergo greater ecological specialization. *Heredity* 124, 726–736.
3. Chavhan, Y., Karve, S., and Dey, S. (2019). Adapting in larger numbers can increase the vulnerability of *Escherichia coli* populations to environmental changes. *Evolution* 73, 836–846.
2. Chavhan, Y., Ali, S.I., and Dey, S. (2019). Larger numbers can impede adaptation in asexual populations despite entailing greater genetic variation. *Evolutionary Biology* 46, 1–13.
1. Karve, S.M., Daniel, S., Chavhan, Y., Anand, A., Kharola, S.S., and Dey, S. (2015). *Escherichia coli* populations in unpredictably fluctuating environments evolve to face novel stresses through enhanced efflux activity. *Journal of Evolutionary Biology* 28, 1131–1143.

Preprint:

- Chavhan, Y.*, Dey, S. & Lind, P. A.* (2022). Bacteria evolve macroscopic multicellularity via the canalization of phenotypically plastic cell clustering. *BioRxiv* (<https://doi.org/10.1101/2022.09.20.508687>)
Under review at **Nature Communications**

*Corresponding authors

PhD thesis

The Effects of Population Size on Adaptation and Trade-offs: Insights from Experimental Evolution with *Escherichia coli* and Individual-based Models

Defended on September 06, 2019 (Indian Institute of Science Education and Research (IISER) Pune under the guidance of Prof. Sutirth Dey)

Previous academic position:

Postdoctoral Research Associate, IISER Pune (September 2019 – June 2021)

Academic grants and fellowships:

- Wenner-Gren Postdoctoral Fellowship for Foreign Postdoctoral Fellows (independent postdoctoral fellowship awarded by the Wenner-Gren Foundations, Sweden (July 2021 – June 2023))
- Stiftelsen Riksförbundet Cystisk Fibros Forskningsfond (Swedish Cystic Fibrosis Association Research Foundation, 2021-2022; co-applicant with Dr. Peter Lind)
- Grant from Magnus Bergvall's Foundation (Sweden, 2022-2023; co-applicant with Dr. Peter Lind)
- Insamlingsstiftelsen för medicinsk forskning vid Umeå universitet (Fundraising foundation for Medical Research at Umeå University, 2022-2024; co-applicant with Dr. Peter Lind)
- Senior Research Fellowship (awarded by the Council for Scientific and Industrial Research, Government of India (April 2017 – January 2019))
- Senior Research Fellowship (awarded by the Ministry of Human Resource Development, Government of India (August 2015 – March 2017))
- Junior Research Fellowship (awarded by the Ministry of Human Resource Development, Government of India (August 2013 – July 2015))

Talks, conference presentations, awards, and workshops:

- Talk (October 2022): Bacteria evolve macroscopic multicellularity via the canalization of phenotypically plastic cell clustering
[National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bengaluru (India)]
- Talk (August 2022): *De novo* evolution of multicellularity via the canalisation of phenotypically plastic cell clumping
[ESEB 2022: Congress of the European Society for Evolutionary Biology (Prague)]
- Talk (August 2022): Combining mutation bias with fitness effects to predict the genotypic and phenotypic trajectories of antibiotic resistance evolution
[Society for Molecular Biology and Evolution (SMBE) Everywhere: Global Symposium 3: Mutational Biases and Adaptation (Online)]
- Talk (December 2019): An interplay of population size and environmental stability explains why fitness costs are expected but rarely detected
[The Indo-Swiss meeting on Evolutionary Biology (Centre for Human Genetics, Bengaluru)]
- Poster (August 2018): Periodic bottlenecks can impede adaptation to selection environments and maladaptation to novel ones despite entailing greater variation
[The Second Joint Congress on Evolutionary Biology (Montpellier)]
- International Travel Award (August 2018): From the Society for the Study of Evolution, United States of America

- Workshop (January 2016): The Second Bangalore School on Population Genetics and Evolution organised by the International Centre for Theoretical Sciences in Bengaluru
- Won Mimamsa (2010 edition), one of the most prestigious nationwide interdisciplinary science competitions for undergraduates (January 2010)
[<http://archive.indianexpress.com/news/ibb-team-wins-science-quiz/575971/>]

Teaching:

- Teacher: HT22 at Umeå University (undergraduate course in basic microbiology and molecular biology (Fall 2022; modules: signal transduction; chemotaxis; biofilms and quorum sensing))
- Teaching assistant: BIO201 at IISER Pune (undergraduate course in ecology and evolution (2 semesters (Fall 2013 and Fall 2014)))
- Teaching assistant: BIO422 at IISER Pune (undergraduate course on advanced evolutionary biology (Spring 2018; module: phenotypic plasticity))
- Teaching assistant: Biostatistics: a user's perspective (public course at IISER Pune; February 2019 – July 2019)

Mentorship:

- Semester Project at Umeå University (Student: Solenn Soullignac): The effects of population size on the evolution of tobramycin resistance in *Pseudomonas aeruginosa* [April 2022 – June 2022 (in conjunction with Dr. Peter Lind)]
- Master's thesis project at IISER Pune (Student: Sarthak Malusare): The effects of population size and environmental composition on the utilization of an unaccustomed niche [August 2018 – April 2019 (in conjunction with Prof. Sutirth Dey)]
- Semester projects at IISER Pune: Mentored six different undergraduate research students pursuing semester projects in evolutionary biology at IISER Pune [August 2015 – December 2019 (in conjunction with Prof. Sutirth Dey)]

Record in competitive examinations:

- Graduate Aptitude Test in Engineering (GATE) - Life Sciences (February 2012), conducted by the Indian Institutes of Technology: Qualified amongst the top 5% candidates in India
- Selected for the 2007 batch comprising top 27 candidates at the Institute of Bioinformatics and Biotechnology (IBB), University of Pune (July 2007)

Pre-doctoral research

- Research assistant (September 2012 – July 2013): How does bacterial evolvability change after evolution in randomly fluctuating environments?
(Under the guidance of Prof. Sutirth Dey, IISER Pune)

- M.Sc. Thesis Project (August 2011 – July 2012): The effects of neutral genetic variation on the dynamics of bacterial response to novel environments (under the guidance of Prof. Sutirth Dey, IISER Pune)
- August 2010 – July 2011: Evolution of evolvability in randomly fluctuating environments (under the guidance of Prof. Sutirth Dey, IISER Pune)
- May 2010 – July 2010: Strategies in a co-evolutionary arms race between a benign brood parasite and its host (under the guidance of Dr. Suhel Quader, National Centre for Biological Sciences, Bangalore)

Educational record:

Date	Degree/School examination	Institute/School	Score
September 2019	Doctor of Philosophy in Evolutionary Biology	Indian Institute of Science Education and Research (IISER) Pune	CGPA (coursework): 9/10
May 2012	Integrated M.Sc. in Biotechnology	Institute of Bioinformatics and Biotechnology, University of Pune	CGPA: 8.30/10
March 2007	Senior Secondary School Exam	JP School, Ratlam	78.22%
March 2005	Secondary School Certificate Exam	Kendriya Vidyalaya, Ratlam	92.80%

Academic references:

Dr. Peter Lind Department of Molecular Biology, Umeå University peter.lind@umu.se	Prof. Sutirth Dey Department of Biology IISER Pune s.dey@iiserpune.ac.in	Prof. Amitabh Joshi Evolutionary Biology Unit JNCASR, Bengaluru ajoshi@jncasr.ac.in
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